Air Quality in Alberta
April to June, 2002

Alberta Environment continuously monitors air quality in Edmonton (three stations), Calgary (three stations), Red Deer, Fort Saskatchewan and Beaverlodge (35 km west-northwest of Grande Prairie). Air pollutants monitored at Alberta Environment stations include carbon monoxide, dust and smoke, oxides of nitrogen, ozone, total hydrocarbons, hydrogen sulphide, sulphur dioxide, ammonia and particulates (PM_{10} and $PM_{2.5}$). The Index of the Quality of the Air (IQUA) is calculated at the Edmonton, Calgary, Red Deer and Fort Saskatchewan stations. The IQUA converts air pollutant concentrations into ***Good***, ***Fair***, ***Poor*** and ***Very Poor*** air quality ratings.

Highlights

- *Good* **air quality was measured from 88 to 98 per cent of the time at Alberta Environment monitoring stations in the second quarter of 2002.** ***Fair*** air quality was reported the remainder of the time at Edmonton, Calgary and Red Deer stations. ***Good*** air quality is the best possible rating and means that there are no known harmful effects to human or environmental health. ***Fair*** air quality indicates that there is adequate protection against harmful effects.

- **Three hours of** *Poor* **air quality were reported in Fort Saskatchewan on June 25 (noon to 3 p.m.).** This episode was caused by the combination of naturally produced ozone with ozone produced by human sources (such as automobiles and industry) during very warm and stagnant weather conditions. Temperatures during this ***Poor*** air quality episode were about 30°C. Ozone is naturally occurring in the environment due to: (1) transport from the "ozone rich" upper atmosphere; and (2) chemical reactions that take place in the atmosphere involving organic chemicals (emitted by trees and vegetation), warm temperatures and sunlight. ***Poor*** air quality is rare in Alberta with only one hour of ***Poor*** air quality measured in the previous five years (1997 to 2001) at Alberta Environment stations in the second quarter. ***Very Poor*** air quality did not occur at any monitoring stations in April, May or June.

For current air quality conditions call ***427-7273*** in Edmonton and ***250-2099*** in Calgary.

Alberta
ENVIRONMENT

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- **High fine particulate ($PM_{2.5}$) levels were measured in the Edmonton area from May 20 to 23.** These high $PM_{2.5}$ values were caused by smoke transported from forest fires in the Smoky Lake and Redwater areas. Smoke from these fires also contributed to high $PM_{2.5}$ levels in Red Deer and Calgary on May 21. Daily averaged $PM_{2.5}$ values during this event ranged from 31 $\mu g/m^3$ (micrograms per cubic metre) at the Calgary Central station to 66 $\mu g/m^3$ at the Edmonton Northwest station. The Canada-wide Standard (CWS) benchmark concentration for 24-hour $PM_{2.5}$ concentrations is 30 $\mu g/m^3$. This episode prompted Capital Health to issue a health advisory for the Edmonton area.

- **Air quality guidelines for carbon monoxide, dust and smoke, nitrogen dioxide, sulphur dioxide and ammonia were not exceeded in the second quarter of 2002.** However, the one-hour guideline for hydrogen sulphide was exceeded once at the Edmonton East station (April 4 from 2 to 3 a.m.). This exceedance was likely caused by fugitive emissions, or leakages, from petroleum storage tanks or petroleum transport vehicles near the monitoring station.

- **Carbon monoxide levels continue to show a downward trend at urban monitoring stations.** Carbon monoxide concentrations in the second quarter of 2002 were from 16 to 40 per cent lower than the ten-year average (1992 to 2001) in Edmonton and Calgary. Downward trends of carbon monoxide are due to better emission control devices on automobiles.

Number of Times Air Quality Guidelines were Exceeded - April to June, 2002

Station	Carbon Monoxide		Dust and Smoke	Hydrogen Sulphide		Nitrogen Dioxide		Ozone	Particulate	Sulphur Dioxide		Ammonia
	1-hour	8-hour	monthly	1-hour	24-hour	1-hour	24-hour	1-hour	24-hour $PM_{2.5}$	1-hour	24-hour	1-hour
Edmonton Central	0	0	0	n/a	n/a	0	0	0	2	n/a	n/a	na
Edmonton Northwest	0	0	0	n/a	n/a	0	0	0	2	n/a	n/a	na
Edmonton East	0	0	0	1	0	0	0	0	2	0	0	na
Calgary Central	0	0	0	n/a	n/a	0	0	0	1	n/a	n/a	na
Calgary Northwest	0	0	0	n/a	n/a	0	0	0	na	n/a	n/a	na
Calgary East	0	0	0	0	0	0	0	0	na	0	0	na
Red Deer	0	0	n/a	0	0	0	0	0	1	0	0	na
Fort Saskatchewan	0	0	0	0	0	0	0	3	3	0	0	0
Beaverlodge	n/a	n/a	n/a	n/a	n/a	0	0	0	na	0	0	na
Guideline	13 ppm	5 ppm	90% of values< 1 COH unit	0.01 ppm	0.003 ppm	0.212 ppm	0.106 ppm	0.082 ppm	30 $\mu g/m^3$ *	0.172 ppm	0.057 ppm	2.0 ppm

na Parameter not monitored at this location

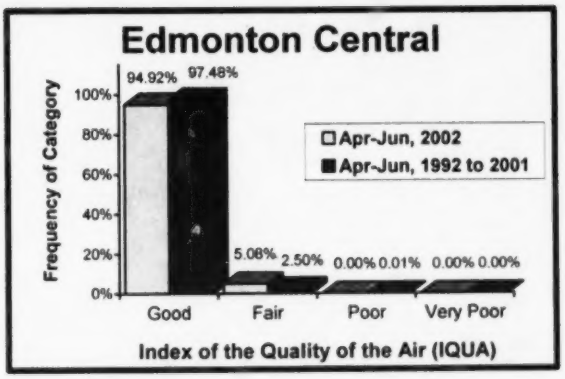
* The level and form of the achievement statistic specified the $PM_{2.5}$ Canada-wide Standard is 30 $\mu g/m^3$, for 24-hour averaging time, based on the 98th percentile annual value, averaged over three consecutive years (Canadian Council of Ministers of the Environment. 2001. Guidance Document on Achievement Determination. Canada-wide Standards for Particulate Matter (PM) and Ozone.)

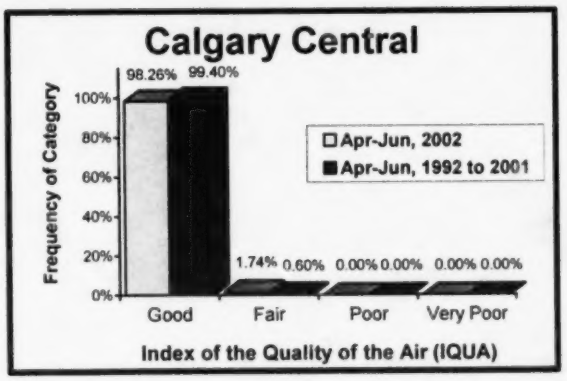
The Index of the Quality of the Air

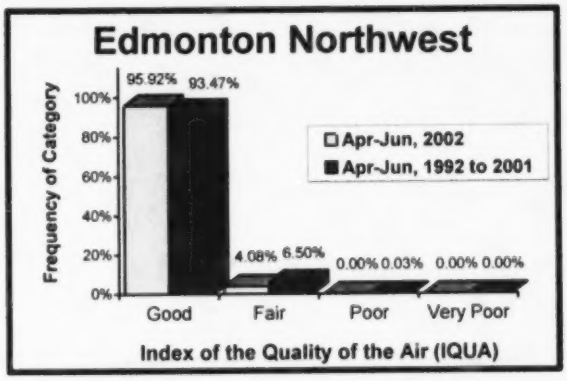
The index of the quality of the air (IQUA) provides the public with a meaningful measure of outdoor air quality. The IQUA is calculated every hour at all Edmonton, Calgary, Red Deer and Fort Saskatchewan monitoring stations. From this index, we can effectively rate air quality as Good, Fair, Poor or Very Poor. Air pollutants used to calculate the IQUA are carbon monoxide, dust and smoke, nitrogen dioxide, ozone and sulphur dioxide. Good, Fair, Poor and Very Poor air quality categories are directly related to guidelines under Alberta's *Environmental Protection and Enhancement Act*, and National Ambient Air Quality Objectives.

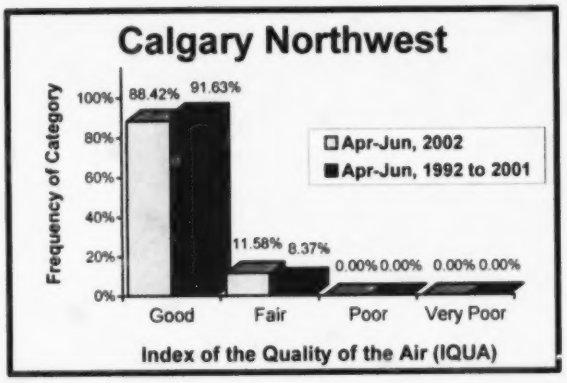
IQUA rating	Description
Good	Desirable range: no known harmful effects to soil, water, vegetation, animals, materials, visibility or human health. The long-term goal is for air quality to be in this range all of the time in Canada.
Fair	Acceptable range: adequate protection against harmful effects to soil, water, vegetation, animals, materials, visibility and human health.
Poor	Tolerable range: not all aspects of human health or the environment are adequately protected from possible adverse effects. Long-term control action may be necessary, depending on the frequency, duration and circumstances of the readings.
Very Poor	Intolerable range: in this range, continued high readings could pose a risk to public health.

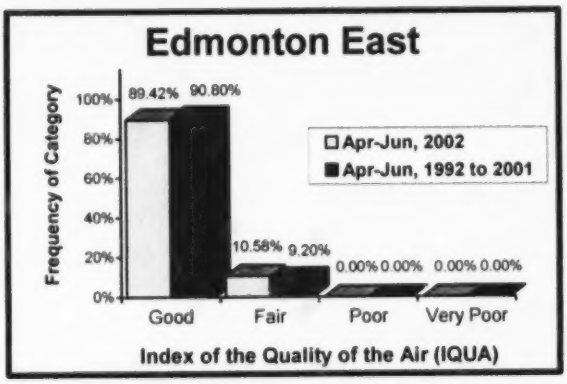
Source: Environment Canada. 1980. Guideline for a short-term air quality index. A report by the Federal-Provincial committee on Air Pollution.

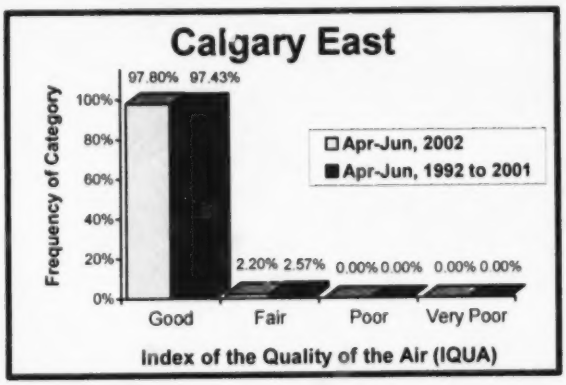


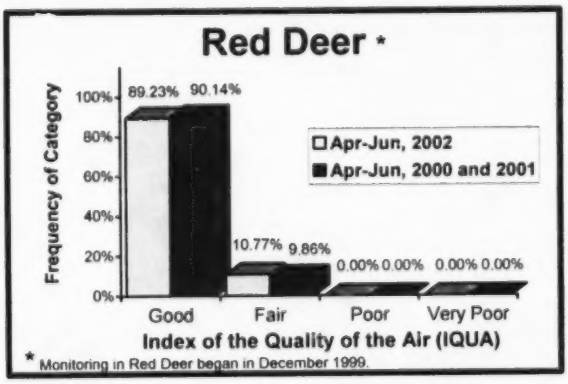




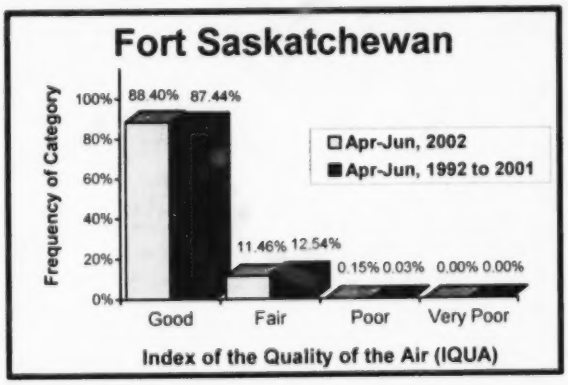








* Monitoring in Red Deer began in December 1999.



Average Concentrations - April to June, 2002 [a]

Parameter	Monitoring Period	Edmonton Stations			Calgary Stations			Red Deer [b]	Fort Saskatchewan	Beaverlodge [c]
		Central	Northwest	East	Central	Northwest	East			
Carbon Monoxide	Apr-Jun 2002	0.48	0.41	0.29	0.48	0.27	0.44	0.26	0.30	na
(ppm)	Apr-Jun 1992-2001	0.68	0.58	0.35	0.72	0.44	0.58	0.24	0.33	na
Dust and Smoke	Apr-Jun 2002	0.10	0.11	0.13	0.15	0.09	0.24	na	0.09	na
(COH unit)	Apr-Jun 1992-2001	0.14	0.13	0.12	0.16	0.07	0.18	na	0.06	na
Hydrogen Sulphide	Apr-Jun 2002	na	na	0.000	na	na	0.001	0.000	0.000	na
(ppm)	Apr-Jun 1992-2001	na	na	0.000	na	na	0.001	0.000	0.000	na
Nitrogen Dioxide	Apr-Jun 2002	0.022	0.017	0.015	0.022	0.011	0.019	0.009	0.010	0.002
(ppm)	Apr-Jun 1992-2001	0.021	0.018	0.013	0.026	0.012	0.022	0.008	0.009	0.002
Ozone	Apr-Jun 2002	0.029	0.028	0.034	0.024	0.035	0.025	0.033	0.033	0.033
(ppm)	Apr-Jun 1992-2001	0.025	0.028	0.032	0.021	0.031	0.024	0.032	0.033	0.037
Sulphur Dioxide	Apr-Jun 2002	na	na	0.002	na	na	0.002	0.000	0.001	0.000
(ppm)	Apr-Jun 1992-2001 [d]	na	na	0.002	na	na	0.002	0.000	0.001	0.000
Total Hydrocarbons	Apr-Jun 2002	1.99	1.98	2.28	2.01	1.92	2.09	1.98	1.74	na
(ppm)	Apr-Jun 1992-2001	2.07	1.91	2.25	2.02	1.93	2.03	1.95	1.83	na
Particulate	Apr-Jun 2002	na	31.6	na	25.3	na	na	na	na	na
(PM_{10} in $\mu g/m^3$)	Apr-Jun 1992-2001 [e]	na	23.7	na	24.5	na	na	na	na	na
Particulate	Apr-Jun 2002	7.3	9.2	8.3	7.2	na	na	6.9	7.4	na
($PM_{2.5}$ in $\mu g/m^3$)	Apr-Jun 1992-2001 [f]	7.7	11.2	9.5	9.6	na	na	8.1	na	na
Ammonia	Apr-Jun 2002	na	na	na	na	na	na	na	0.004	na
(ppm)	Apr-Jun 1992-2001	na	na	na	na	na	na	na	0.004	na

Maximum One-Hour Concentrations - April to June, 2002 [a]

Parameter	Edmonton Stations			Calgary Stations			Red Deer	Fort Saskatchewan	Beaverlodge	One-Hour Guideline
	Central	Northwest	East	Central	Northwest	East				
Carbon Monoxide (ppm)	2.6	3.1	1.7	2.4	1.8	3.1	1.2	2.1	na	**13.0**
Dust and Smoke (COH Unit)	2.3	2.3	2.8	1.5	1.0	2.0	na	4.0	na	**na**
Hydrogen Sulphide (ppm)	na	na	0.016	na	na	0.006	0.003	0.004	na	**0.010**
Nitrogen Dioxide (ppm)	0.071	0.071	0.058	0.086	0.053	0.067	0.042	0.048	0.028	**0.212**
Ozone (ppm)	0.071	0.074	0.076	0.069	0.080	0.063	0.075	0.087	0.054	**0.082**
Sulphur Dioxide (ppm)	na	na	0.031	na	na	0.022	0.004	0.014	0.005	**0.172**
Total Hydrocarbons (ppm)	3.1	6.5	19.7	3.0	2.7	5.6	4.2	5.2	na	**na**
Particulate (PM_{10} in $\mu g/m^3$)	na	378	na	292	na	na	na	na	na	**na**
Particulate ($PM_{2.5}$ in $\mu g/m^3$)	293	308	296	75	na	na	223	394	na	**na**
Ammonia (ppm)	na	na	na	na	na	na	na	0.161	na	**2.0**

a All average and maximum values based on data collected from April to June.

b Monitoring at the Red Deer station began in December 1999.

c Monitoring at the Beaverlodge station began in November 1997.

d Sulphur dioxide monitoring began in February 1999 at the Beaverlodge station.

e PM_{10} monitoring began in January 1996 at the Calgary Central station and November 1993 at the Edmonton Northwest station.

f $PM_{2.5}$ monitoring began in November 1997 at the Calgary Central station, July 1998 at the Edmonton Northwest station, October 2000 at the Edmonton Central station, August 2000 at the Edmonton East station, December 2000 at the Red Deer station and November 2001 at the Fort Saskatchewan station.

na Parameter not monitored at this location or no one-hour guideline for parameter.